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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte FEDERICK H. RUMPF,
ROSCOE W. TAYLOR, and
ALVIN E. TOOMBS

Appeal 2008-0984
Application 09/857,490
Technology Center 1700

Decided: March 28, 2008

Before CHUNG K. PAK, CATHERINE Q. TIMM, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Statement of the Case

This is an appeal under 35 U.S.C. § 134 from a final rejection of claims 2-8 and 15-17. The rejection of claim 18 has been withdrawn. (Ans. 3). We have jurisdiction under 35 U.S.C. § 6.

Appellants' invention relates to a process for the manufacture of carbon black that employs dewatered, heated off-gas in a fuel rich combustion strategy. An understanding of Appellants' invention can be gleaned from independent claim 15 which appears below:

> 15. A furnace carbon black producing process comprising the steps of:
>
> (a) obtaining off-gas from a carbon black furnace,
>
> (b) dewatering and heating the off-gas and substantially removing any existing carbon black therefrom to obtain dewatered and heated off-gas, and then
>
> (c) feeding a combustion gas feed stream comprising the dewatered and heated off-gas and feeding an oxidant gas stream comprising an oxidant gas to a burner portion of the carbon black furnace, wherein the carbon black furnace comprises said burner portion wherein said combustion gas feed stream is combusted in the presence of said oxidant gas feed stream to produce hot combustion gases and a reactor portion wherein carbon black is produced by an interaction of the hot combustion gases with a hydrocarbon feedstock introduced to the reactor portion downstream of where said dewatered and heated off-gas is introduced in the carbon black furnace,
>
> (d) controlling the combustion gas feed stream and oxidant gas feed stream so that the combusting of the combustion gas feed in the burner portion to produce hot combustion gases takes place in a fuel-rich condition so that the combustion gas feed stream does not completely combust in the burner portion of the carbon black furnace, and
>
> (e) producing carbon black in the reactor portion of the carbon black furnace by interaction of the hot combustion gases with a hydrocarbon feedstock under said fuel rich conditions.

The Examiner relies on the following references in rejecting the appealed subject matter:

Rothbühr	4,636,375	Jan. 13, 1987
Doshi	4,690,695	Sep. 1, 1987
Sircar	5,240,472	Aug. 31, 1993
Lynum	5,527,518	Jun. 18, 1996

Claims 2-8 and 15-17 stand rejected under 35 U.S.C. § 103(a) as follows:

I. Claims 2 and 15-17 stand rejected over Rothbühr.

II. Claims 3 and 8 stand rejected over Rothbühr in view of Sircar and Doshi.

III. Claims 4-7 stand rejected over Rothbühr in view of Lynum.

We have thoroughly reviewed each of Appellant's arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the Examiner's rejections.

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). "[A]nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1740-41 (2007) *quoting In re Kahn*, 441 F.3d 977, 988

(Fed. Cir. 2006); *In re Bozek*, 416 F.2d 1385, 1390 (CCPA 1969) ("Having established that this knowledge was in the art, the examiner could then properly rely, as put forth by the solicitor, on a conclusion of obviousness 'from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference.'"); *In re Hoeschele*, 406 F.2d 1403, 1406-07 (CCPA 1969) ("[I]t is proper to take into account not only specific teachings of the references but also the inferences which one skilled in the art would reasonably be expected to draw therefrom . . .").

Claims 2 and 15-17 stand rejected over Rothbühr. The Examiner finds that Rothbühr describes a furnace carbon black producing process comprising the steps of treating carbon black off-gas to remove water and carbon, then recycling it. (Ans. 3). The Examiner finds that Rothbühr suggests heating the off gas before recycling to increase the carbon yield, and/or efficiency of combustion. The Examiner finds that Rothbühr describes a fuel rich combustion gas feed stream. (Ans. 3).

Appellants contend that Rothbühr does not teach or suggest a fuel-rich condition used in a carbon black producing process wherein an off-gas is recycled as required by steps (d)-(e) of claim 15. Rather, Rothbühr teaches a lean gas strategy for carbon black production which teaches away from the claimed invention. (App. Br. 12-15).[1]

The issue presented is as follows:

[1] Appellants' arguments are limited to the utilization of fuel rich conditions. Appellants have not argued that the remaining process steps of claim 15 are not obvious to a person of ordinary skill in the art.

Has the Examiner reasonably determined that a person of ordinary skill in the art would have found it obvious to perform a furnace carbon black producing process comprising a fuel-rich condition wherein an off-gas is recycled, within the meaning of 35 U.S.C. § 103? On this record, we answer this question in the affirmative.

The Specification discloses it is known to operate a furnace carbon black production process under fuel rich conditions employing an excess of the natural gas relative to the air or other oxidant gas stream. The Specification discloses this process is undesirable because of uneconomically high cost. Specifically the Specification states:

> It is widely recognized that the furnace carbon black process does not operate at desirable efficiency levels. Employing air and natural gas as the feedstreams to the burner, efficiency typically would not exceed sixty percent (60%) for a lean burn operation, that is, an operation in which the natural gas is feed at less than stoichiometric amount relative to the oxygen content of the air feed stream. It is desirable to have the hot combustion gases produced in the burner at temperatures sufficiently high to effect efficient pyrolysis of the hydrocarbon feedstock, also referred to as the "make hydrocarbon" to produce carbon black, while not having the temperature of the combustion gases excessively high, which could cause damage to the refractory lining of the combustion zone and/or the reaction zone. Operating at nearly stoichiometric conditions, with feed rates high enough to meet throughput requirements and other necessary operating conditions, may produce excessively high temperatures. Operating under fuel rich conditions, that is, employing an excess of the natural gas relative to the air or other oxidant gas stream, may produce tolerable combustion gas temperatures coupled with improved yield, even yield in excess of sixty percent (60%). Under such operating conditions, however, it has been found that the raw material costs generally are uneconomically high. Accordingly, it is typical to operate under a fuel lean combustion strategy to achieve adequate

> throughput and tolerable raw material costs, notwithstanding the resultant low carbon black yield.

(Spec. 1-2).

Rothbühr discloses it is known to operate a furnace carbon black production process under a variety of conditions. Rothbühr discloses fuel gas, combustion air, and carbon black raw material quantity are decisive values for the operation of a carbon black reactor. Rothbühr discloses these values are not variable arbitrarily. (Col. 1-2). Rothbühr discloses the following limiting factors are generally controlling:

> The volume of combustion air used determines the developing volume of exhaust gas and thus fixes the through-put of the production plant. In view of a profitable method of operation, one will strive to realize the maximumally useable volume of combustion air.
>
> The fuel gas required for energy production (or some other fuel) is mostly employed in such volumes, related to the volume of oxygen introduced with the combustion air, that it is present in deficiency. On the other hand, it is one of the principles of the furnace black process that the volume of oxygen is used in deficiency relative to the fuel and carbon black raw material volume. Whenever one wishes to achieve high yields, i.e., whenever as little as possible air-oxygen is to come into contact with the carbon black raw material and is to burn the latter, as high volumes as possible as fuel gas are used. A 60-70% turnover of the air-oxygen with the fuel gas is a value quite customary in practice. A limitation on the fuel gas volume used arises primarily from the temperature resistance of the ceramic lining because a high amount of fuel gas leads to higher temperature loads.
>
> Whenever one starts with a method of operation which uses the maximum combustion air volume and the greatest

> possible fuel gas volume, then the carbon black raw material volume is also fixed by the selection of the carbon black quality: higher inputs of oil lead to coarser carbon black (larger primary particle size) with higher yields, lower oil volumes on the contrary lead to correspondingly finer carbon black (smaller primary particle size) with lower yields.

(Col. 1, l. 39 - col. 2, l. 4).

Thus, the present record establishes that it was known to a person of ordinary skill in the art that operating a furnace carbon black production process under fuel rich conditions may produce tolerable combustion gas temperatures coupled with improved yield, even yield in excess of sixty percent (60%). (Spec. 2). The person of ordinary skill in the art would have recognized the modifications that were required in order to operate under fuel rich conditions. *See* Rothbühr which discloses that the temperature resistance of the ceramic lining is a limitation on the fuel gas volume used in a furnace carbon black production process. (Col. 1, ll. 57-62). Also, Rothbühr suggests heating the off gas before recycling to increase the carbon yield, and/or efficiency of combustion. As such, the present record reveals that it would have been obvious to a person of ordinary skill in the art to operate a furnace carbon black production process under either fuel rich or fuel lean conditions and heating the off gas before recycling to increase the carbon yield, and/or efficiency of combustion. The nature of the fuel rich process taught by Rothbuhr would not deter a person of ordinary skill in the art from operating its process under either fuel rich or fuel lean conditions.[2]

[2] Appellants have not substantively and specifically argued the remaining process limitations of the independent claim.

Regarding claim 2, Rothbuhr suggests that any fuel rich conditions can be used so long as the temperature is not so high as to damage the reactor lining.

Appellants contend that Rothbühr does not teach or suggest the recitations of Claim 16. In support of this argument, Appellants rely on Rothbühr's Example 1 and the reference cited therein.

The Examiner in the answer correctly asserts that Rothbühr discloses the recycling of off gas. (Ans. 5; Rothbühr, cols. 4 and 9). Appellants has not challenged the Examiner's position in the responsive Brief.

Claims 3 and 8 stand rejected over Rothbühr in view of Sircar and Doshi. Appellants contend that Sircar and Doshi do not relate to carbon black producing processes and do not overcome the deficiencies of Rothbühr. According to Appellants, the Examiner has not provided proper motivation why one skilled in the art would look to Sircar and Doshi for PSA. (App. Br. 22-23)

We do not agree. As properly determined by the Examiner, Rothbühr describes a furnace carbon black production process that comprises the step of dewatering gas. Sircar and Doshi both describe dewatering gas utilizing PSA is a known technique. (Ans. 3-4). A person of ordinary skill in the art would have looked to the PSA techniques taught by Sircar and Doshi for the well known purposes of dewatering gases.

Claims 4-7 stand rejected over Rothbühr in view of Lynum. The Examiner cited Lynum for describing heating the recycle gases utilizing plasma heating. The present record reveals that when recycling the off gas from a carbon black production process, the gas is subject to heating. (Spec.

2-3). As such, a person of ordinary skill in the art would been led to reheat the recycle gas of Rothbühr utilizing well known heating techniques, including plasma heating. Appellants have not asserted that unexpected results are obtained when utilizing the plasma heating technique.

For the foregoing reasons and those presented in the Answer, the rejections of claims 2-8 and 15-17 under 35 U.S.C. § 103(a) are affirmed. As a final point with respect to the § 103 rejection, we note that Appellants base no argument upon objective evidence of nonobviousness, such as unexpected results.

ORDER

The rejection of claims 2-8 and 15-17 under 35 U.S.C. § 103(a) is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

tf/ls

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